

What is claimed is

1. A process for reducing the surface reflectance of polymer substrates by means of ion bombardment, in  
5 which at least one substrate surface is modified by means of an argon/oxygen plasma with formation of a refractive index gradient layer.
2. The process as claimed in claim 1,  
10 characterized in that the process reduces the surface reflectance to less than 2% in the wavelength range from 400 nm to 1100 nm.
- 15 3. The process as claimed in at least one of the preceding claims,  
characterized in that the process reduces the surface reflectance to less than 1.5% in the  
20 wavelength range from 420 nm to 860 nm.
4. The process as claimed in at least one of the preceding claims,  
25 characterized in that the modification takes place via the bombardment with high-energy ions which are generated by means of a plasma ion source.
5. The process as claimed in at least one of the preceding claims,  
30 characterized in that the ions impacting the substrate during the ion bombardment have an energy of from 100 eV to 160 eV, preferably from  
35 120 to 140 eV.
6. The process as claimed in at least one of the preceding claims,

characterized in that the duration of the ion bombardment is from 200 to 600 s, preferably from 250 to 350 s.

- 5    7.    The process as claimed in at least one of the preceding claims,

characterized in that the plasma ion source is operated with at least 30 sccm of oxygen.

10

8.    The process as claimed in at least one of the preceding claims,

characterized in that the ion bombardment is carried out at a pressure of about  $3 \cdot 10^{-4}$  mbar.

15

9.    The process as claimed in at least one of the preceding claims,

characterized in that the polymer substrates used comprise polymethyl methacrylates (PMMA), methylmethacrylate-containing polymers, or diethylene glycol bisallyl carbonate (CR39).

20

- 25    10.    The process as claimed in claim 9,

characterized in that the polymer used comprises polymethyl methacrylate (PMMA), the ions impacting the substrate during the ion bombardment have an energy of from 100 eV to 160 eV, preferably from 120 to 140 eV, and the duration of the ion bombardment is from 200 to 400 s, preferably from 250 to 350 s.

30

- 35    11.    The process as claimed in claim 9,

characterized in that the polymer used comprises diethylene glycol bisallyl carbonate (CR39), the ions impacting the substrate during the ion

bombardment have an energy of at least 120 eV, preferably 150 eV, and the duration of the ion bombardment is at least 500 s.

- 5 12. A surface-modified substrate composed of a  
polymer, in particular polymethyl methacrylate  
(PMMA), methyl-methacrylate-containing polymers,  
or diethylene glycol bisallyl carbonate (CR39),  
10 treated by the process as claimed in at least one  
of the preceding claims.
13. The surface-modified substrate as claimed in claim  
10,
- 15 characterized in that the at least one substrate  
surface has a surface reflectance reduced to less  
than 2% in the wavelength range from 400 to  
1100 nm.
- 20 14. The surface-modified substrate as claimed in at  
least one of claims 10 or 11,
- characterized in that the thickness of the  
gradient layer is at least 230 nm.
- 25 15. The use of the process as claimed in at least one  
of claims 1 to 9 for reducing the reflection of  
optical elements, e.g. Fresnel lenses.